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Summary of Pollution-Caused Fish Kills Reported in 1960 (1st Annual Report)

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16. Abstract (Limit: 200 words)

This report is an analysis of pollution-caused fish kills compiled from data supplied by State officials. It includes analytical text and the following tables: summaries by State, source, water body, average number of fish killed, changes in aquatic food organisms, corrective action, severity, selected questions, type of water, month, and duration. Also includes a cumulative listing of the reports received.

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POLLUTION-CAUSED FISH KILLS IN 1960

Issued by the

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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Basic Data Branch

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SUMMARY OF POLLUTION-CAUSED FISH KILLS REPORTED IN 1960

The activity covered in this report, the first of a series to be prepared annually, has been initiated by the Public Health Service in response to the need for additional information on the effect of pollution in the Nation's waters. In early 1960, the Surgeon General asked all State conservation and fish and game agencies to assist him by reporting instances of fish kills that were attributable to pollutants entering the streams or lakes of the Nation. It was suggested that existing surveillance procedures be used in gathering the information. The response was enthusiastic and most gratifying.

A self-addressed, franked, post card reporting form was devised in cooperation with the U.S. Fish and Wildlife Service and the various independent conservation organizations. This form, Figure 1, was furnished to the State agencies to be completed as occasion needed and mailed to the Basic Data Branch of the Division of Water Supply and Pollution Control. The Public Health Service plans to release quarterly cumulative listings of these fish kills and to publish an annual statistical summary of the results with such interpretation as may be warranted. The program went into effect June 1, 1960, and the first listing included all reports for the four-month period ending September 30. The present summary covers all the information available for the year 1960, including a few reports of fish kills which occurred before June 1.

Data Handling

As the reports were received, a copy was furnished to the U.S. Fish and Wildlife Service even if, for editorial reasons, the reports were not to be included in the tabulations. Reports were excluded if, from notations, it was clear that the fish kill was not related to pollution. Examples of the latter include "red tide" in offshore sea water and kills caused by oxygen depletion from natural biological activity. Some reports indicated that a kill had actually occurred but too long before to determine cause or extent. Other reports stated that pollution occurred but no fish were killed, and still others related to shellfish which died of causes not related to pollution. In all, only a small number of reports received have been excluded from this summary.

Those reports to be included in the listing were coded for machine punch card tabulation so that various summarizations or listings could be obtained. The use of punch card methods enables any late reports to be added to future listings in proper time sequence.

Coverage

The notifications included in this summary come from 36 States. In no instance was any State asked to modify its existing methods of self-notification, but merely to pass on to the Public Health Service such information relating to fish kills as was developed in connection with its normal operating procedures. In some States extensive efforts are made to collect reports on all fish kills. In others, this information is developed only when a prosecution for a fish kill occurs. The extent of coverage in this summary varies geographically for other reasons. Not all States joined the reporting systems at the same time. and, of course, not all States have the same area or amount of surface water. Also, population densities and industrial and agricultural activities, all of which affect the quality of stream waters, differ from State to State.

It is often difficult to determine that a fish kill has been directly, or even indirectly, caused by pollution. Identifying the exact toxic agent, if any, is usually far more involved, if not impossible. The Public Health Service has accepted the individual reports received as being the considered judgment of the initiating State agency and published the information as such. While there is, perhaps, room to question the findings in a few of the reports received, a thorough review of all the returns presents a convincing picture of careful field work performed by many conscientious public servants.

Each kill listed and tabulated in the report was, in the opinion of the State representative, directly related to pollution. Details of the reports vary widely from State to State, from a simple statement of the kind of pollution to the incrimination of a specific chemical. If more than one type of pollution was involved, all are listed.

The Data

Since the inception of the reporting system, a total of 286 notifications of pollution-caused fish kills have been received from 36 States, as shown in Table 1, column 1. It is anticipated that as the program proceeds into 1961 all States will be represented, and to a wider degree than is reflected in this first summary.

A total of 149 reports replied to the question on the number of fish killed by giving a figure. Some responses were "many", "hundreds" or "several thousand". While at best, the number reported in any one kill is only an estimate, that number has been used in the tables without any attempt at rounding. *No fictitious accuracy is implied by this procedure.* The use of the figures as reported, however, does avoid the vexatious problem of balancing between tables. The number shown should be considered a minimum, however, for the reasons mentioned above. A total of more than 6 million fish were reported as being killed in the 149 cases where a numbered estimate was given.

The river mileage affected was reported in 176 instances, for a total of 1153 miles. In addition, 51 miles of lake and bay shore line were affected as were 1407 acres of lakes, reservoirs and bays.

Sources of Pollution

As mentioned earlier, the designated source of pollution was accepted as assigned by the reporting agency. Because more than one source could be, and was, assigned, a total of 305 sources was given for the 286 reports. As may be seen from Table 2, all but 51 of these were identifiable. Industrial wastes accounted for the largest number of kills, 98, or 39 percent of known sources. Agricultural poisons were second with 81, or 32 percent of known sources. The "Other" category includes such occasions as a pipeline break, shipping discharges, discharges from airfields or diesel stations. The kills in this category all stemmed from known sources, but could not be tied properly to any of the other categories.

Industrial wastes caused more fish to die, almost 5.5 million, than any other source. One kill traced to industrial waste was estimated at 5 million. This was in 19 miles of the Kanawha River for about 2 days late in August, caused by a spill of methyl alcohol. Ninety-five percent of the fish in that kill were of the forage or rough types. The report for this kill stated that there were many thousands of minnows and named 15 other types of fish involved. The report goes on to say, "Aquatic insect life was apparently killed since some were observed floating in the water dead. Crayfish by the thousands came out of the water onto the rocks. These died either from exposure or from the pollutant." Even after subtracting this 5 million, the number of fish killed by industrial wastes is nearly double the next named source, domestic sewage.

It is interesting to examine the average size of the kills. After allowing for such extreme values as the 5 million above and three other reports over 100,000, the average kill represented 2,925 fish. As shown in Table 4, industrial wastes had the largest average, 3,950, and mining operations the smallest at 1,775. Applying the appropriate averages to the notifications not reporting the number killed, it is estimated that the 286 reports in this summary represent at least 6,300,000 fish killed even after allowing for kills attributable to more than one source.

Other Data

One of the questions asked referred to the effect of the pollutant on aquatic food organisms. Table 5 shows the answers arranged by source of pollution. Nearly half of the 92 affirmative responses were from the category of agricultural poisons, but all sources were represented. There were 29 negative replies, and the question was not answered on 184 occasions.

Respondents recommended a specific corrective action for 171 of the reported kill sources, and in 7 instances stated that no corrective action was needed. See Table 6.

Those reporting were able to name a specific toxic agent in 62 percent of the 305 listed sources. This includes 5 specific agents from the 51 sources "Unknown". Aside from domestic sewage, which is in itself considered a specific agent, and 9 of the 10 reports on mining operations, agricultural poisons had the highest percentage of specific agents named—85 percent of 81 reports. In addition to saying "herbicide", "pesticide", etc., the actual poison was named in a great many cases—such as rotenone, DDT, 2–4–D or enderin. Specific causitive agents were named in two-thirds of the kills by industrial wastes. Cyanide and metallic ions were the most common. The percentage of specific agents was high for "Other Sources", 82 percent, principally because the

source determination was dependent on the cause. By the same reasoning, "Unknown Source" revealed only 10 percent specific causes.

While reporters were able to give a quantifiable number of fish killed in only 52 percent of the instances, they were able to express an opinion as to the degree of severity of the kill in 92 percent of the cases. A distribution of these responses is shown in Table 7. One kill in five was considered fatal to all fish, a third of them were heavy, and a fifth were moderate. The rest were light, or not stated.

General Evaluation

An attempt was made to evaluate the reporting by examining the degree to which definite answers were given. This is shown in Table 8, which presents the percentage of reports with definite responses to questions. As mentioned before, the number of fish killed was given 52 percent of the time. There seems to be no wide variation among the sources. A specific causative agent was named 62 percent of the time.

Respondents were asked to give an estimate of the percentage distribution of the fish killed among the three types, game, forage and rough or trash fish. This distribution was reported 84 percent of the time. The degree of response to this question among pollution sources ranged from 76 percent for "Other Causes" up to 91 percent for agricultural poisons. The extent of the damage in terms of miles or acres affected was given in 76 percent of the cases. This figure ranged from 61 to 82 percent. No pattern of response is apparent. One State did not answer this question at all. The duration of the critical effect was given 65 percent of the time with a range of 52 to 80 percent.

Respondents' Comments

Although the figures presented in the tables of this summary are highly informative, the reports of the fish and game wardens and conservation inspectors reveal most clearly the seriousness of the water pollution problem as measured by fish kills. A sampling of remarks received on these individual reports is given below. Each report is shown as a separate paragraph, substantially as presented by the State official.

It is believed that kill occurred as a result of accidental discharge or spill of penta chlorophenol solution used to treat logs at sawmill which was washed into stream by a heavy rain. As to changes in aquatic food organisms, the remaining aquatic insects observed were small stonefly nymphs (Plecoptera) and a few Coleoptera. Caddis fly larvae (Trichoptera) and Diptera were absent in affected section.

Fish kill believed to have been caused by tobacco spraying immediately prior to a heavy rainfall. Water runoff from fields which had been sprayed emptied into Scantic River. Spraying should be restricted during time of expected rainfall.

Diesel oil spilled during the refueling of diesel locomotives reached the stream and caused the fish kill. The railroad has taken the necessary action to intercept and collect the oil before it reaches the stream.

On July 5th, the first day of kill, the Milltown Reservoir was flushed. Iron deposits that had settled in this reservoir from the March 1960 pollution of the Clark Fork River above this reservoir washed out of the reservoir and caused the fish kill. Iron was found on gills. Aquatic organisms show a reduction over previous years; however, this could be due to the March 1960 pollution.

Poison chemical from C. killed 680 fish. This is chronic, the third kill for this company. "Contribution" of $1,000 on its way to pay for fish. Corrective action should be that they run their poison into a lagoon or haul away.

Editor's Note: There were 21 reported instances wherein this State collected a total of $4,383.60 in "voluntary contributions" to pay for loss of fish.

During heavy runoff metallic ions leached from mining operations enter salmon holding and spawning area in the Sacramento River. At point of entry to the river, Spring Creek builds up a delta during moderate flows. During heavy runoff the delta materials slough off and join dissolved metallic ions and thus give a "slug" effect in the area. As to corrective action needed, the responsible agency will dam Spring Creek and meter flow throughout the year. To be done in 1962.

An accidental spillage of pole spray preservative (pentide mixed with fuel oil) in brook caused a total kill of fish. There was also a heavy kill of salamanders and insect life.

Truck wrecked, dumping contents of cargo into stream. Nullifying agent used to kill poison at source, but that which had already been washed into stream did the damage. A close watch was kept and water diluted poison in 9 days. Stream was very slow moving.

Detergents in floor wash and fermented dairy wastes caused the kill. A sewage line was broken in percolation field, and company allowed wastes to empty into river at dark. All repairs are now completed and system is in good working order.

Ammonia and unknown metallic wastes from rare metals refinery caused a total kill of 6,000 to 10,000 fish in 10 acres of lake for 20 days. Total kill of aquatic insect nymphs and larvae as well as vegetation. This outfit has been giving trouble for several years. Too many inplant expansions with no thought for expansion or better operation of waste disposal system.

Apparent cause of fish kill was discharge from mushroom house. The mushroom house was steam sprayed with a solution containing a poisonous insecticide. The condensed spray solution discharged to the ditch and subsequent rain carried solution to stream. Settlement of $100 voluntary contribution received from insurance company.

The count of dead fish was 81 on August 27. It is known that many more died in this area. Seventeen more were counted on August 30. The pollution from sugar beet processing waste is chronic and intermittent. It occurs each year when processing begins. Legal action such as an injunction or restraining order is needed and has been requested.

The kill (of 10,000 plus in a reservoir) was confined to young-of-the-year common sunfish. No trout or other species occupying deeper waters were affected. I found that a power line right-of-way had been sprayed approximately one week previous to the kill. The line runs along Ponset Brook for 300 feet before entering the reservoir. The power line also runs along another small tributary. Dead fish were present in the quiet waters and inlet coves of both brooks. Aside from this, I could determine no other evidence of spraying, and there are no industrial plants on the watershed. (The source was checked "Unknown".)

Cannery wastes caused the kill. The day after, a new connection to the city sewer system was completed.

A kill of 3,000 was caused by domestic sewage (loss of oxygen) because the disposal plant was handling too big a load for the size of the plant.

City plant runs raw sewage in creek from time to time. Local observers state that is what happened. Sawmill effluent enters three blocks below sewage plant.

The Borough of T------ applied perchloride to purify the water. Used 45 pounds. Stream flow less than 1 cubic foot per second. Received voluntary contribution of $200 from the Borough via insurance company check.

Kill consists mostly of minnows and carp. Pollution from cannery wastes is seasonal and has been going on each year for 40 years. Game fish are absent due to previous pollution.

This kill was reported to the conservation Officer S---- by telephone that trout were dying. S---- could find no fish the following day. However, he and the District Biologist took water samples from above and below the effluent of the R------ Plating Co. as reports indicated fish were noticed immediately below this point. The samples were submitted to the Toxicology Laboratory for analysis. The sample above the suspected effluent was negative for cyanide and that immediately below indicated 2 ppm cyanide to be present.

Five days after the kill by paper mill wastes the company took bids for the necessary piping

to convey their wastes to the city sewer system. The successful bidder has been instructed to proceed with the work.

Kill (by cyanide and cyanogen chloride) occurred over several hours. Caused by siphoning solution via a faulty cooling coil. Authorized settlement by stipulation for $1,000. Referred to Board for action on violation of permit (Public Health Laws).

Farmer kept stock tank of insecticide (chlordane) near barn with pipe to field for treating celery. Pipe was broken, pesticide flowed through six or eight spring-fed farm fish ponds killing private rainbow trout stock. Fish to 16 inches long.

Acid from abandoned coal strip pits. Complete kill for 6–8 miles for weeks. This is an annual kill, at approximately the same time each year, unless a dry year. Water accumulates in the pits, and after a heavy rain it is flushed into the creek. This is one of the few remaining muski streams in the Cumberland Mountains. They need complete coverage of strip pits and a drainage ditch allowing water to flow into a broad wooded area.

Silt and cement from a tunnel construction caused this kill. Only a few dead fish were observed. There is no way of determining how many were killed and what species. Probably many trout were involved as this stream is planted. The construction agency should use methods which will not allow this material to enter the stream. The silt blanket probably smothered out bottom food organisms for about 26 miles to where the river enters the Don Pedro Reservoir.

On April 27, 2 days after the fish were first sighted, I heard of the kill and proceeded to the A---- C---- Co., a suspected polluter. The river has a pH of 6.0; the effluent from the plant had a pH of 7.0. Two water samples from above and below the plant effluent were submitted to the State Health Department Laboratory to examine for cyanide. The sample from above the effluent was negative and that from below the effluent had considerable cyanide.

On August 22 and 23, the city water treatment plant cleaned its settling basins and discharged the material into the river. The flow in the river was very low and the organic material in the sludge discharged to the river depleted the river of dissolved oxygen.

Cement washings cause a high pH; resulted in a heavy kill. Corrective action needed was neutralization of high pH discharge. Corrective measures taken and penalty to be obtained under the Conservation Laws.

A group of people were camping and fishing on creek. They noticed many dead fish and heard that Mr. ------, a nearby rancher, had sprayed trees along creek with 2-4-D. The party drank creek water and made coffee of it and all members of party became very sick to their stomachs. They reported it to us. Offender will be contacted and warned against such action.

Dye waste was run direct into creek. Turned water and food organisms deep black. A direct line was run from the textile mills in M---- to the creek behind the sewage lagoons. The lagoons were bypassed and emptied direct into creek. This was done for one day until I found it and had it stopped. Now dye waste is running back into lagoon system.

A spill of some 2,500 barrels of oil from ship required action to eliminate fire hazard. A ship service company was called and it began applying the oil-dispersing chemicals. It is not known whether it was the chemical or the resulting compound or mixture which was lethal to fish and other aquatic life. Most bottom organisms including worms, shrimp and isopods were killed outright. The State should establish limits for chemicals and initiate research for less toxic chemicals for treatment of oil spills.

A paper mill is the suspected pollutant in this instance. They have been known to treat the algae from Paper Mill Pond at the head of their intake system with copper sulphate in excessive dosage and have caused fish kills in the past. We under-

stand they have changed to Phygon-XL for an algacide. We also determined that the effluent from their plant has a pH in the neighborhood of 4.5 and also at the time of the kill the temperature of this discharge was in excess of 100 degrees F. It raised the temperature of the river from 60 degrees to 73 degrees.

This is a chronic kill area (creamery wastes) and only because of the limited or nonexistent game fish population in the stream have we not pressed for a hearing. Investigated by District Sanitary Engineer. What is needed is a settling basin for plant wash operations and more stringent disposal of whey.

Kill caused by pea ensilage liquor from stacking of pea vines too near stream. Several hundred fish dead at three stations. Warning had been given in 1959 of possible danger. Case turned over to Water Pollution Control Board, since water is classified.

This chemical (Aqualin, 60 ppm for 1 hour) was used as a weedicide. The ditches are separate from the lake but are pumped into the lake. No fish were killed in the lake proper, but there was total kill in the irrigation canals. The use of this chemical may become quite extensive in this area for control of weeds in the irrigation ditches.

Phenol from refinery. Oil refinery has been contacted many times concerning fish killed by their operations. Representatives seem to be working on the problem, but are reluctant to spend money on corrective measures, but are now building additional settling ponds.

This kill (from toxaphene) was checked 24 hours after the kill was reported to have started. The evening before, a crop dusting plane circled the stream directly above where the kill started. Mostly small fish were killed. Larger fish were seen alive in the area where the kill started. Noted many snails dead in the area affected. Heavy snail population directly above poisoned area. More snails seen below toxic zone. Chemistry: Oxygen 7 ppm; pH 7; total hardness 30 ppm.

Corn husks and wastes from cannery killed the fish and one muskrat. All aquatic food destroyed. Thick coating of scum covers bottom of stream. Cannery needs a pond or pump to carry juices away. They are running into stream. A similar situation exists in this area annually.

Cyanide wastes kill thousands. Corrective action needed: Rinse solutions to be treated in chlorination system. Action initiated for collection of penalty and correction of the situation under conservation laws.

Manure storage for mushroom farm killed 1,000 fish. Health Department has told these people about this condition repeatedly. It must be corrected or we will prosecute each day it exists. Voluntary contribution of $350 asked for and received.

Raw sewage into stream. This has happened several times in the past. Each time they either have motor trouble or a broken pipe.

Acid mine waste from gob piles (coal mining) caused a fish kill value estimated at $14,886.84 for 25.8 miles of stream. Corrective action needed: Creation of substantial levees around gob piles.

Corrective action needed is treatment of industrial wastes. The foregoing is supposed to become a reality if and when the responsible paper mills tie their disposal in with proposed new treatment plant for the city. Fish kills in this location have occurred regularly over the years.

Industrial wastes kill. Owner plans immediate installation of septic tank and leach bed.

Oil from pipeline. Oil escaped from pipeline into Pine Creek approximately two months before fish kill. Oil entered at head of stream where there was little water. Some oil was burned by pipeline personnel, but only a small amount. Two months later heavy rains caused oil to move downstream into deeper water where fish life was abundant, resulting in fish kill. Pollution case to be filed. Responsible people need to take greater interest in its control. Public relations with responsible

people plus court action needed, since both have been lacking in previous years in this district.

Drainage from agricultural silo. Keep silo drainage from entering stream.

Pollution caused by solution in steaming outfit used to clean trailers. Excess solution flowed into stream. Stream contained a considerable amount of minnow life. Water green in color, oil or grease on surface. Stream bed gray, muddy appearance. Company paid a voluntary contribution of $100.

Accidental spill of spray from potato fields. High water washed away. Need care in handling agricultural spray and in rinsing equipment.

Break in oil pipeline. Heavy rains followed. Now repaired. Need closer check on lines.

Water company used too much copper sulphate to kill plants. This is the second time in 5 years this has happened. We will no doubt ask for $100. We find that a penalty usually prevents a similar occurrence in the future.

Domestic sewage kill caused by bypass during construction. Improvements being made on city disposal plant to remedy this. Need increased capacity of treatment plant.

Cyanide kill of 60,000 fish. Total kill for 2 days over 4 miles. Several conferences between city officials, industry, and sanitary engineers are expected to correct this situation. Attorney General's office has claim for damage. May have been industrial waste, but it was integral part of sanitary sewage plant effluent. Need improved municipal waste control.

Herbicide resulted in a total kill of 5,000 plus over 10 miles of stream for 3 days. Apparent total mortality of aquatic insect nymphs and larvae. Vandals stole barrel thought to be gasoline, found it to be herbicide, so threw barrel in creek.

Editor's Note: There were 27 separate reports from one State naming enderin, a cane borer insecticide, as the causative agent. Each report called for more cautious use of the chemical. A plea was entered for statutory control, since volunteer controls have proven futile. The kills are nonselective and usually total.

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REV. 8-60

DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

(WASHINGTON USE)

Form Approved: Budget Bureau No. 68-R706

REPORT OF POLLUTION-CAUSED FISH KILL

1. LOCATION:
   Stream or Lake .....
   Nearest Town ..... State .....
2. DATE OF KILL: ..... 3. TYPE WATER: ☐ Fresh ☐ Salt ☐ Estuary
4. SOURCE OF POLLUTION:
   ☐ Mining Operations ☐ Agricultural Poisons ☐ Domestic Sewage
   ☐ Industrial Wastes ☐ Other ..... ☐ Unknown
   Specific cause if known .....
5. TYPE OF FISH KILLED
   ..... % Game
   ..... % Forage
   ..... % Rough or Trash
   100%
6. ESTIMATED NUMBER KILLED .....
7. SEVERITY:
   ☐ Total ☐ Heavy ☐ Moderate ☐ Light
8. EXTENT: Miles of stream or acres of lake affected .....
9. DURATION OF CRITICAL EFFECT: ..... days ..... hrs.

(Fold Here)

10. SIGNIFICANT CHANGES IN AQUATIC FOOD ORGANISMS .....

11. CORRECTIVE ACTION NEEDED .....

12. COMMENTS .....

REPORTING OFFICIAL	AGENCY MAILING ADDRESS	DATE

FIGURE 1

TABLE 1.—*Pollution-caused fish kill summary by State*

State	Number of reports	Reporting fish		Extent of damage					
		Number of reports	Number of fish	Miles of river		Acres of lake		Miles of shore	
				Number	Miles	Number	Acres	Number	Miles
Alabama	4	2	1, 500	2	2				
California	22	13	8, 700	8	61	6	27	5	11
Connecticut	19	9	17, 920	9	25	4	18		
Florida	4	2	3, 500	3	8	1	1		
Georgia	5			4	58	1	40		
Idaho	2	2	253, 000	1	3	1	650		
Illinois	8	8	102, 958	8	51				
Indiana	17	13	20, 705	15	46				
Iowa	5	3	1, 375	5	14				
Kentucky	1			1	3				
Louisiana	36	2	3, 500	31	499	1	5		
Maine	1					1	564		
Maryland	6	1	300	1	2			1	6
Massachusetts	6	2	6, 450	5	10	1	20		
Michigan	25	22	75, 073						
Minnesota	3			3	4				
Mississippi	1			1	30				
Missouri	7	6	38, 000	6	57				
Montana	3	3	7, 300	2	21				
Nebraska	2	2	10, 500	2	6				
New Jersey	2	2	3, 300	1	1				
New York	13	3	10, 336	11	20				
North Carolina	2	2	101, 000	2	8				
Ohio	13	8	259, 159	7	22				
Oklahoma	3							2	6
Oregon	9	5	14, 075	6	26	1	60		
Pennsylvania	29	26	51, 471	18	30	2	2		
Tennessee	3			2	7	1	1		
Texas	19	4	5, 550	14	67	2	4	1	10
Utah	2	2	18, 000					1	15
Vermont	1	1	3, 000	1	3				
Washington	3	2	6, 000	3	24				
West Virginia	5	1	5, 000, 000	2	39	1	10		
Wisconsin	2			1	3	1	1		
Wyoming	1	1	900	1	3				
Hawaii	4	2	250			1	4	3	3
Total	286	149	6, 023, 822	176	1153	25	1407	13	51

TABLE 2.—*Fish kill summary by source of pollution*

Source	Number of reports	Reporting number of fish	
		Reports	Fish
Mining operations	10	5	250, 312
Agricultural poisons	81	32	73, 110
Domestic sewage	27	14	286, 800
Industrial wastes	98	56	5, 463, 450
Other sources	38	20	38, 202
Unknown	51	31	189, 756
Total	305	158	[1] 6, 023, 822

[1] Adds to 6,301,630 because of 277,808 fish reported from more than one source.

TABLE 3.—*Fish kill summary by type of water body*

Type of water	Number of reports	Reporting fish		Extent of affected area			
		Number of reports	Number of fish	Number of reports	Miles	Number of reports	Acres
River	234	119	5, 963, 172	176	1, 153	----------	----------
Lake	38	23	58, 770	3	21	21	1, 389
Bay	14	7	1, 880	10	30	4	18
Total	286	149	6, 023, 822	189	1, 204	25	1, 407

TABLE 4.—*Estimated average size of kill and number killed, by source of pollution*

Source	Estimated average size of kill	Estimated number killed adjusted for unrepresentative reports
Mining operations	1, 775	339, 000
Agricultural poisons	2, 285	165, 000
Domestic sewage	2, 830	323, 000
Industrial wastes	3, 950	5, 629, 000
Other	1, 910	73, 000
Unknown	2, 990	150, 000
Total	2, 925	[1] 6, 679, 000

[1] This figure includes at least 300,000 from more than one source of pollution.

TABLE 5.—*Response as to whether pollution caused significant changes in aquatic food organisms*

Source	Yes	No	Not stated	Total
Mining operations	6	------	4	10
Agricultural poisons	47	9	25	81
Domestic sewage	3	3	21	27
Industrial wastes	21	8	69	98
Other sources	10	3	25	38
Unknown	5	6	40	51
Total	92	29	184	305

TABLE 6.—*Response as to whether a specific corrective action was recommended*

Source	Yes	"None needed"	Not stated	Total
Mining operations	5	1	4	10
Agricultural poisons	58	1	22	81
Domestic sewage	18	1	8	27
Industrial wastes	60	1	37	98
Other sources	27	2	9	38
Unknown	3	1	47	51
Total	171	7	127	305

TABLE 7.—*Response as to severity of kill*

Source	Total kill	Heavy kill	Moderate kill	Light kill	Not stated	Total
Mining operations	4	3	1	----------	2	10
Agricultural poisons	27	29	11	8	6	81
Domestic sewage	5	10	7	5	----------	27
Industrial wastes	16	30	23	22	7	98
Other sources	5	15	10	4	4	38
Unknown	3	16	13	14	5	51
Total	60	103	65	53	24	305

TABLE 8.—*Percentage of definite responses to selected questions*

Source	Number killed	Specific agent	Types of fish	Severity of kill	[illegible]	[illegible]
Mining operations	50	90	90	80	70	80
Agricultural poisons	40	85	91	93	68	65
Domestic sewage	50	100	78	100	81	52
Industrial wastes	57	66	82	93	82	60
Other sources	53	82	76	89	61	66
Unknown	62	10	85	90	75	77
Total	52	62	84	92	76	65

TABLE 9.—*Fish kill summary by type of water*

Type of water	Number of reports	Reporting number of fish killed	
		Reports	Fish
Fresh	265	139	5, 919, 842
Salt	1	1	2, 000
Brackish	20	9	101, 980
Total	286	149	6, 023, 822

TABLE 10.—*Fish kill summary by date of kill*

Month	Number of reports	Reporting number of fish killed	
		Reports	Fish
January [1]	1	----	----
February [1]	----	----	----
March [1]	2	1	3, 000
April [1]	9	7	23, 435
May [1]	7	6	34, 310
June	65	33	69, 306
July	58	34	109, 862
August	68	28	[2] 5, 446, 120
September	28	12	32, 146
October	22	12	26, 357
November	12	7	15, 766
December	14	7	[3] 263, 520
Total	286	149	6, 023, 822

[1] Reporting program did not begin until June 1, 1960.
[2] One report of 5,000,000.
[3] One report of 250,000.

TABLE 11.—*Frequency distribution of reported duration of critical effect*

Days	Mining operations	Agricultural poisons	Domestic sewage	Industrial wastes	Other sources	Unknown source	Total reports
<1		6	2	12	7	5	32
1	1	29	5	15	9	6	65
2	2	18	4	19	4	12	59
3	3	6	4	4		5	22
4	1			1	1	1	4
5		3		2	1		6
6					1		1
7	1		1		1		3
8				1	1		2
9		1		2	1	1	5
10						1	1
15				1			1
18				3			4
20			1	1			2
26			1		1		2
43						2	2
60							
Total	8	63	18	61	27	33	210

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		MONTH	DAY	YEAR	(1) MUNICIPAL OPERATIONS	(2) AGRICULTURAL POISONS	(3) DOMESTIC SEWAGE	(4) INDUSTRIAL WASTES	(5) OTHER	(6) UNKNOWN	GAME	FORAGE	TRASH		(1) TOTAL	(2) HEAVY	(3) MODERATE	(4) LIGHT		DA.	HR.
ALABAMA																					
CAHABA RIVER	CENTREVILLE ALA	7	22	60						6	10	20	70	-		2			1M	-	12
CAHABA RIVER	CENTREVILLE ALA	11	23	60				4			10	20	70	-				-	-	-	-
TOMBIGBEE RIVER	MCINTOSH ALA	6	15	60						6	0	0	100	1,000			4		-	-	12
NOLAND CREEK	PRATTVILLE ALA	7	20	60		2					5	15	80	500		2			1M	-	8
CALIFORNIA																					
CARQUINEZ STRAIT	CROCKETT CALIF	6	11	60						6	100	0	0	5			3		8A	-	-
TEMESCAL CREEK	EMERYVILLE CAL	6	3	60			3				0	100	0	1,300			3		1A	-	-
TRIB/PORTER CR	FULTON CALIF	8	24	60			3				100	0	0	2,000	1				-	1	-
MORRISON SLOUGH	GRIDLEY CALIF	7	27	60				4			0	50	50	500		2			3A	-	-
TUOLUMNE- CHERRY	GROVELAND CALIF	6	16	60	1						0	0	100	-		2			26M	2	-
SAN FRANCISCO BY	HAYWARD CALIF	6	6	60						6	100	0	0	30				4	2M	-	-
ARROYO CANAL	LOS BANOS CALIF	8	18	60		2					15	0	85	-	1				3M	1	-
MARTINEZ STRAIT	MARTINEZ CALIF	7	20	60						6	100	0	0	100		2			-	-	-
LR SAN DIEGO BAY	NATL CITY CALIF	6	2	60						6	0	0	100	-		2			4M	-	-
COSUMNES RIVER	OMO RANCH CALIF	10	10	60				4			5	0	95	-	1				20M	-	-
IRRIG CANAL-P263	PATTERSON CALIF	8	17	60						6	50	0	50	-			3		1M	1	-
SPRING CREEK	REDDING CALIF	12	2	60	1						-			20				-	-	2	-
SAN FRANCISCO BY	RICHMOND CALIF	6	7	60						6	100	0	0	45				4	2M	1	-
SAN FRANCISCO BY	RICHMOND CALIF	6	11	60				4			5	93	2	-			3		5A	-	-
LAURITZEN CANAL	RICHMOND CALIF	8	22	60		2		4			100	0	0	90		2			1M	-	12
SAN FRANCISCO BY	RODEO CALIF	6	22	60					5		25	75	0	-				-	2M	-	6
NAPA RIVER	ST HELENA CALIF	11	26	60					5		0	50	50	1,000	1				3M	9	-
ANTONELLI POND	SANTA CRUZ CAL	9	1	60		2		4			40	30	30	-	1				5A	1	-
UNNAMED POND	SANTA CRUZ CAL	9	29	60				4			-			1,250	1				5A	18	-
KINGS R-SOUTH FK	STRATFORD CALIF	8	28	60		2					10	0	90	1,000		2			3M	2	-
OLD RIVER	TRACY CALIF	8	27	60				4			80	10	10	1,200	1				3M	10	-
OLD RIVER	TRACY CALIF	10	--	60				4			75	0	25	-		2			2M	-	-
CONNECTICUT																					
PAGE PARK POND	BRISTOL CONN	4	15	60					5		0	100	0	-			3		1A	1	-
SCANTIC RIVER	BROAD BROOK CON	7	26	60		2					0	0	100	-				-	-	3	-
SANDY BROOK	BROOKLYN CONN	8	13	60					5		10	20	70	-	1				1M	2	-
PEWTER POT BROOK	E HARTFORD CONN	6	18	60					5		35	35	30	200			3		2M	-	6
HIGGANUM RESVR	HIGGANUM CONN	8	8	60						6	-			10,000				-	-	-	-
QUINNIPIAC RIVER	MERIDEN CONN	7	21	60			3	4			-			1,000			3		8M	-	-
NEWTOWN PK POOL	NEWTOWN CONN	6	14	60					5		5	90	5	-			3		1A	1	-
FRY BROOK	PLAINFIELD CONN	6	30	60						6	10	10	80	-		2			1M	2	-
EIGHT MILE RIVER	PLANTSVILLE CON	4	25	60				4			5	40	55	20				4	1A	-	-
FULLING MILL BR	PROSPECT CONN	3	21	60				4			90	0	10	-				-	-	-	-
BLADENS RIVER	SEYMOUR CONN	7	20	60				4			25	50	25	100				4	1M	-	3
LINDER POND	SHARON CONN	6	5	60						6	0	100	0	-	1				15A	3	-
HART POND	SOUTHINGTN CONN	4	7	60						6	0	100	0	2,000			3		-	10	-
QUINNIPIAC RIVER	SOUTHINGTN CONN	8	15	60				4			0	50	50	-				4	1M	-	3
QUINNIPIAC RIVER	SOUTHINGTN CONN	8	26	60				4			2	3	95	1,000			3		8M	-	10
WILLIMANTIC RIV	WILLIMANTIC CON	10	15	60						6	5	5	90	5,300		2			6M	3	-
STILL RIVER	WINSTED CONN	6	3	60				4			10	10	80	100			3		1M	1	
FLORIDA																					
BOLES CREEK	BRADENTON FLA	9	2	60						6	80	20	0	-				-	5M	3	-
ALLIGATOR CREEK	CALLAHAN FLA	5	26	60			3				20	10	70	-	1				1M	3	-
POND/PATRICK AFB	DRIFTWD MAN FLA	8	11	60					5		95	5	0	2,000		2			1A		2
ESCAMBIA RIVER	PENSACOLA FLA	6	18	60				4			30	30	40	1,500			3		2M	-	12
GEORGIA																					
OKAPILCO CREEK	BERLIN GA	10	10	60						6	35	35	30	-	1				30M	-	-
GUM CREEK	CORDELE GA	12	14	60				4			30	60	10	-	1				4M	2	-
WILLIAMS LAKE	CORDELE GA	12	14	60				4			-			-	1				40A	2	-
ROCKY CREEK	DUDLEY GA	7	27	60		2					50	20	30	-			3		4M	2	-
WITHLACOCHEE R	HAMIRA GA	11	25	60				4	5		-			-				-	20M	10	-

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		MONTH	DAY	YEAR	MINING OPERATIONS (1)	AGRICULTURAL CHEMICAL POISONS (2)	DOMESTIC SEWAGE (3)	INDUSTRIAL WASTES (4)	OTHER (5)	UNKNOWN (6)	GAME	FORAGE	TRASH		TOTAL (1)	HEAVY (2)	MODERATE (3)	LIGHT (4)		DA.	HR.
HAWAII																					
PEARL HARBOR	AIEA HAWAII	12	13	60						6	80	10	10	-			3		1M	2	-
PEARL HAR-E LOCH	AIEA, OAHU, HAI	8	21	60			3				2	49	49	200				4	4A	-	18
2ND CANAL-FT KAM	HONOLULU HAWAII	10	31	60					5		50	50	0	-		2			1M		
KAPAA CANAL	KAPAA HAI	10	21	60				4			50	50	0	50				4	1M	2	-
IDAHO																					
SNAKE/MILNER RES	BURLEY IDAHO	12	9	60			3	4			1	0	99	250,000		2			3M	26	-
MURTAUGH LAKE	BURLEY IDAHO	12	20	60			3	4			25	0	75	3,000		2			650A	20	-
ILLINOIS																					
SUGAR CREEK	BLOOMINGTON ILL	9	17	60					5		72	3	25	698		2			1M	2	-
KANKAKEE RIVER	KANKAKEE ILL	9	15	60				4		6	24	39	37	3,258		2			5M	2	-
SANGAMON RIVER	KINCAID ILL	7	28	60	1						51	39	10	65,762		2			26M	3	8
WEST SHOAL CREEK	LITCHFIELD ILL	11	3	60						6	5	0	95	13,869		2			6M	2	-
SANGAMON RIVER	NIANTIC ILL	9	5	60						6	16	77	7	11,374		2			5M	2	-
DES PLAINES RIV	RIVER GROVE ILL	7	26	60						6	29	0	61	149				4	2M	2	-
DES PLAINES RIV	RIVERSIDE ILL	6	14	60						6	40	0	60	932				4	2M	2	-
YELLOW CREEK	STOCKTON ILL	8	7	60				4			0	97	3	6,896		2			4M	2	-
INDIANA																					
HALFWAY CREEK	ALBANY IND	10	10	60						6	-			50				4	1M	3	-
BR/WHITE LICK CR	BRIDGEPORT IND	8	22	60					5		-			200			3		3M	2	-
WILSON DITCH	CARROLTON IND	11	14	60						6	-			200			3		3M	1	-
14 MILE CREEK	CHARLESTOWN IND	12	29	60					5		20	10	70	6,000	1				4M	9	-
INDIAN CREEK	CRAWFORDSVL IND	7	29	60						6	-			300			3		2M	1	-
MISSISSINEWI RIV	EATON IND	7	28	60				4			0	100	0	200			3		1M	1	-
HURRICANE CREEK	FRANKLIN IND	9	3	60				4			-			-				4	3M	1	-
MUDDY FORK CREEK	GREENSBURG IND	11	21	60				4			-			155		2			-	2	-
RACCOON CREEK	HILLSDALE IND	10	1	60				4			5	80	15	1,000				4	-	2	-
WHITE RIVER	INDIANAPLIS IND	9	9	60				4			-			-			3		1M	-	12
WHITE RIVER	MUNCIE IND	8	24	60					5		-			-			3		1M	1	-
CARPENTER CREEK	REMINGTON IND	7	21	60			3				-			100			3		1M	1	-
CARPENTER CREEK	REMINGTON IND	10	17	60						6	10	0	90	6,000		2			9M	1	6
EAGLE CREEK	SPEEDWAY IND	8	6	60				4			-			1,500			3		3M	-	18
L MISSISSINEWA R	UNION CITY IND	9	3	60				4			-			-		2			4M	2	-
MISSISSINEWA RVS	UNION CITY IND	9	27	60				4			0	25	75	500		2			7M	-	-
TURKEY CREEK	WINDFALL IND	10	22	60					5		-			4,500		2			7M	4	-
IOWA																					
BOYER RIVER	EARLY IOWA	7	7	60		2					30	30	40	-		2			3M	-	-
BOONE RIVER	GOLDFIELD IOWA	7	20	60				4			5	5	90	200	1				1M	20	-
SHELLROCK RIVER	GREENE IOWA	8	--	60			3		5		25	40	35	1,000			3		5M	-	12
FARMERS CREEK	LA MOTTE IOWA	6	15	60				4			0	0	100	175			3		2M	-	-
BUCK CREEK	RYON IOWA	8	4	60					5		1	90	9	-		2			3M	1	-
KENTUCKY																					
LITTLE GOOSE CR	MANCHESTER KY	10	14	60	1						15	20	65	-	1				3M	1	-

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		MONTH	DAY	YEAR	MINING OPERATIONS (11)	AGRICULTURAL RUNOFF (12)	DOMESTIC SEWAGE (13)	INDUSTRIAL WASTES (14)	OTHER (15)	UNKNOWN (16)	GAME	FORAGE	TRASH		TOTAL (11)	HEAVY (12)	MODERATE (13)	LIGHT (14)		DA.	HR.
LOUISIANA																					
BAYOU BOEUF	MORGAN CITY LA	9	--	60				4			15	60	25	-		2			3M	3	-
PEARL RIVER	BOGULUSA LA	7	16	60				4			20	50	30	-		2			30M	5	-
SHELL GIBSN CNAL	GIBSON LA	8	17	60	2						15	30	55	-	1				-	1	-
BAYOU BLACK	HOUMA LA	8	10	60	2						20	40	40	-		2			7M	2	-
BAYOU BLACK	HOUMA LA	8	15	60	2						15	60	25	-	1				10M	2	-
SHELL HUMPH CNAL	HOUMA LA	8	17	60	2						-			-		2			2M	2	-
TERREBONNE CANAL	HOUMA LA	8	25	60	2						15	50	35	-		2			6M	1	-
BAYOU TECHE	JEANERETTE LA	7	20	60	2						10	40	50	2,500				-	3M	1	-
MISSISSIPPI R	L PROVIDENCE LA	12	--	60						6	50	50	0	-			3		200M	60	-
BAYOU BOEUF	MORGAN CITY LA	8	21	60	2						15	40	35	-		2			5M	-	12
ATACHAFALAYA R	MORGAN CITY LA	12	--	60						6	98	0	2	-		2			150M	60	-
CANCIENNE CANAL	NAPOLEONVLE LA	8	18	60	2						10	40	50	-		2			7M	1	-
BAYOU PIGEON	PLAQUEMINE LA	7	25	60	2						15	45	40	-		2			3M	1	-
GRAND RIVER	PLAQUEMINE LA	7	30	60	2						20	50	30	-		2			8M	2	-
BAYOU SORRELL	PLAQUEMINE LA	8	--	60	2						25	35	40	-	1				9M	2	-
CHAMBERLAIN CNAL	PORT ALLEN LA	4	17	60	2						30	40	30	1,000		2			3M	2	-
BAYOU CHOCTAUX	PORT ALLEN LA	8	--	60	2						30	40	30	-	1				3M	2	-
DRAINAGE CANAL	RACELAND LA	8	8	60	2						10	60	30	-	1				5M	1	-
HALPEN CANAL	RACELAND LA	8	8	60	2						5	30	65	-	1				6M	2	-
FOLSE CANAL	RACELAND LA	8	27	60	2						35	50	15	-	1				2M	1	-
LAKE FAUSSE PT	ST MARTINVLE LA	8	--	60	2						20	50	30	-		2			5A	1	-
PARISH CANAL	THIBODAUX LA	6	24	60	2						10	45	55	-	1				3M	2	-
PHILIPS CANAL	THIBODAUX LA	6	24	60	2						20	35	45	-	1				5M	2	-
PIPELINE DR/CNAL	THIBODAUX LA	6	24	60	2						10	50	40	-				-	5M	2	-
SAM FORET CANAL	THIBODAUX LA	6	25	60	2						-			-		2			-	1	-
SAM FORET CANAL	THIBODAUX LA	6	25	60	2						15	50	35	-		2			-	1	-
THERIOT CANAL	THIBODAUX LA	6	25	60	2						15	50	35	-	1				3M	1	-
GRAND BAYOU	THIBODAUX LA	8	--	60	2						20	50	30	-	1				2M	1	-
THERIOT CANAL	THIBODAUX LA	8	8	60	2						-			-	1				3M	1	-
CHACAHOULA CANAL	THIBODAUX LA	8	24	60	2						15	30	55	-	1				3M	1	-
BAYOU L ONION	THIBODAUX LA	8	25	60	2						15	45	40	-	1				3M	1	-
GRAND BAYOU	THIBODAUX LA	8	26	60	2						30	40	30	-				-	1M	1	-
PIPELINE DR/CNAL	THIBODAUX LA	8	26	60	2						15	60	25	-	1				1M	1	-
TERREBONNE CANAL	THIBODAUX LA	8	28	60	2						25	60	15	-	1				5M	1	-
SAM FORET CANAL	THIBODAUX LA	9	25	60	2						15	50	35	-		2			-	1	-
WHITE CASTLE CNL	WHITE CASTLE LA	8	18	60	2						20	60	20	-		2			3M	1	-
MAINE																					
L OSSIPEE LAKE	WATERBORO ME	11	23	60						6	100	0	0	-			3		564A	15	-
MARYLAND																					
SEVERN RIVER	ANNAPOLIS MD	6	2	60						6	1	98	1	-		3			-	-	-
ST MARTINS RIVER	BISHOPVILLE MD	6	--	60		3	4				-			-	1				-	-	-
POTOMAC RIVER	BRUNSWICK MD	10	17	60					5		-			-		2			-	-	-
CHESAPEAKE BAY	PARADISE BCH MD	6	22	60						6	1	95	4	-				4	6M	2	-
BEAR BRANCH	WESTMINSTER MD	8	11	60	2						50	50	0	300		2			2M	5	-
WYE MILLS STREAM	WYE MILLS MD	8	6	60				4			-			-		2			-	-	-
MASSACHUSETTS																					
TEN MILE RIVER	ATTLEBORO MASS	8	20	60				4			34	33	33	-		2			3M	4	-
HOOSIC RIVER	N ADAMS MASS	7	30	60				4			0	5	95	-		2			1M	1	-
SACKETT BROOK	PITTSFIELD MASS	8	19	60					5		20	60	20	450		2			1M	1	-
JORDAN POND	SHREWSBURY MASS	8	6	60	2						90	10	0	6,000			3		20A	5	-
LITTLE RIVER	WESTFIELD MASS	7	--	60				4			5	20	75	-		2			1M	-	3
LITTLE RIVER	WESTFIELD MASS	7	3	60	2						0	20	80	-		2			2M	1	-
MICHIGAN																					
LOCH ALPINE POND	ANN ARBOR MICH	4	24	60	2						100	0	0	400			3		-	-	-
WILLOW RUN CREEK	BELLEVILLE MICH	4	8	60				4			0	0	100	-				4	-	-	-
UPPER LONG LAKE	BLOOMFIELD MICH	6	30	60	2						100	0	0	300				4	-	2	-
GREENOAK LAKE	BRIGHTON MICH	6	4	60	2						100	0	0	-		2			-	-	-
STONY CREEK	CARLETON MICH	8	2	60	2						40	0	60	25,000				-	-	-	-
CASS RIVER	CARO MICH	4	24	60				4			80	0	20	17,000		2			-	-	-
CASS RIVER	CASS CITY MICH	9	20	60				4			2	0	98	1,134				-	-	-	
DUCK CREEK	CLARKSVLLE MICH	7	6	60				4			10	0	90	100				4	-	-	-
BLACK RIVER	CROSWELL MICH	9	4	60				4			1	0	99	320				4	-	-	-
CASS RIVER	FRANKENMUTH MIC	7	12	60				4			24	0	76	4,046			3		-	-	-
TITTABAWASSEE R	FREELAND MICH	6	18	60						6	14	86	0	11,728		2			-	2	-
HORSESHOE CREEK	HAMBURG MICH	8	16	60				4			100	0	0	400			3		-	-	-

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RIVER OR LAKE AFFECTED	NEAREST TOWN OR CITY	DATE OF KILL			IMPUTED CAUSE OF KILL						TYPE OF FISH KILLED (PERCENT)			ESTIMATED NUMBER OF FISH KILLED	SEVERITY				ESTIMATED MILES OR ACRES AFFECTED	DURATION OF CRITICAL EFFECT	
		MONTH	DAY	YEAR	MINING OPERATIONS (1)	AGRICULTURAL RUNOFF (2)	DOMESTIC SEWAGE (3)	INDUSTRIAL WASTES (4)	OTHER (5)	UNKNOWN (6)	GAME	FORAGE	TRASH		TOTAL (1)	HEAVY (2)	MODERATE (3)	LIGHT (4)		DA.	HR.
MICHIGAN CONT.																					
HOUGHTON LAKE	HOUGHTON L MICH	4	15	60				4			100	0	0	15				4	-	-	-
STURGEON CREEK	MIDLAND MICH	12	6	60						6	100	0	0	1,500			3		-	-	-
PAW PAW RIVER	PAW PAW MICH	9	10	60				4			50	0	50	100				4	-	-	-
LAKE CORA	PAW PAW MICH	10	10	60						6	100	0	0	6,500		2			-	-	-
MANDON LAKE	PONTIAC MICH	9	--	60		2					100	0	0	900				4	-	-	-
HERSEY RIVER	REED CITY MICH	7	14	60						6	0	0	100	2,750				-	-	-	-
RUM CREEK	ROCKFORD MICH	6	24	60		2					100	0	0	350			3		-	-	-
CLINTON RIV-N BR	ROMEO MICH	9	12	60		2					98	0	2	1,200		2			-	-	-
ROUGE R-EVANS BR	ROYAL OAK MICH	6	21	60		2					80	0	20	-				-	-	-	-
FISHERS LAKE	ST JOSEPH MICH	5	26	60		2					100	0	0	200			3		-	-	-
MITCHELL CR	TRAVERSE MICH	5	14	60				4			90	10	0	110			3		-	-	-
MITCHELL CREEK	TRAVERSE MICH	7	16	60				4			100	0	0	20				4	-	-	-
L THORNAPPLE RIV	WOODLAND MICH	7	10	60						6	0	0	100	1,000				4	-	2	-
MINNESOTA																					
SAUK RIVER	MELROSE MINN	6	8	60			3	4			2	0	98	-				4	1M	-	-
MOOSE RIVER	MOOSE LAKE MINN	8	21	60			3				5	5	90	-				4	2M	-	-
LE SUEUR RIVER	WASECA MINN	9	7	60			3	4			5	0	95	-				4	1M	-	-
MISSISSIPPI																					
PEARL RIVER	PICAYUNE MISS	7	19	60				4			-			-		2			30M	1	-
MISSOURI																					
DRAING/DS 2,3&19	CAMPBELL MO	5	6	60		2		4			3	94	3	11,000		2			-	2	-
LINDLEY CREEK	HERMITAGE MO	7	13	60					5		15	0	85	5,000		2			8M	45	-
INDIAN CREEK	KANSAS CITY MO	7	21	60				4			33	67	0	1,000		2			1M	3	-
ST JOHNS DITCH	SIKESTON MO	8	13	60		2					3	0	97	-	1				10M	2	-
WILSN CR-JAMES R	SPRINGFIELD MO	7	18	60			3	4			10	10	80	4,000		2			15M	2	-
WILSN CR-JAMES R	SPRGFLD-NIXA MO	8	5	60			3	4			30	70	0	15,000		2			17M	1	12
DRY CR-BIG PINEY	WAYNESVILLE MO	7	13	60			3				25	50	25	2,000		2			6M	1	-
MONTANA																					
RAT LAKE	BOZEMAN MONT	7	25	60		2					100	0	0	200			3		-	5	-
CLARK FORK-COL R	MISSOULA MONT	7	5	60	1						75	5	20	5,000			3		20M	3	-
RATTLESNAKE CR	MISSOULA MONT	10	15	60				4			5	95	0	2,100	1				1M	-	-
NEBRASKA																					
MIDDLE&SALT CRS	LINCOLN NEBR	6	28	60						6	0	80	20	7,500			3		1M	1	-
BIG BLUE RIVER	SEWARD NEBR	8	9	60					5		10	5	85	3,000		2			9M	-	-
NEW JERSEY																					
SECND NESHANIC R	FLEMINGTON NJ	8	13	60				4			10	80	10	300			3		1M	2	-
LAKE VIEW MEM LK	RIVERTON NJ	4	1	60			3				25	25	50	3,000		2			-	3	-
NEW YORK																					
CATTARAUGUS CR	ARCADE N Y	9	2	60				4			10	60	30	10,000		2			3M	-	-
TROUT BROOK	BLISS NY	9	22	60		2					30	35	35	-		2			1M	-	-
MARBLE RIVER	CHATEAUGAY NY	6	18	60			3		5		10	90	0	-		2			1M	-	-
RANSOM CREEK	CLARENCE NY	10	28	60					5		0	60	40	-				-	-	-	-
MONGAUP CREEK	DE BRUCE NY	7	26	60					5		-			-		2			1M	-	-
EAST KOY CREEK	GAINESVILLE N Y	8	10	60		2					10	70	20	-		2			4M	-	-
FLINT CREEK	GORHAM NY	10	--	60				4			0	60	40	36				4	1M	-	-
METTAWEE RIVER	GRANVILLE N Y	9	3	60						6	-			-				-	-	-	-
E BR SANDY CREEK	HOLLEY NY	9	26	60			3		5		0	100	0	300				4	1M	-	-
CHUBB&AUSABLE RS	LAKE PLACID N Y	10	21	60			3				-			-		2			3M	-	-
OAK ORCHARD CR	MEDINA NY	7	18	60					5		0	60	40	-		2			1M	-	-
IDLEPORT CREEK	OAKFIELD NY	7	15	60				4			0	70	30	-				-	2M	-	-
OATKA CREEK	WARSAW NY	6	6	60				4			0	50	50	-		2			2M	-	-

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		MONTH	DAY	YEAR	MUNICIPAL SEWAGE (1)	AGRICULTURAL WASTES (2)	DOMESTIC SEWAGE (3)	INDUSTRIAL WASTES (4)	OTHER (5)	UNKNOWN (6)	GAME	FORAGE	TRASH		TOTAL (1)	HEAVY (2)	MODERATE (3)	LIGHT (4)		DA.	HR.
NORTH CAROLINA																					
NEUSE RIVER	CHERRY PT AS NC	8	12	60						6	-			100,000			3		7M	1	-
CROSS CREEK	FAYETTEVILLE NC	9	--	60		2					-			1,000				-	1M	-	-
OHIO																					
JELLOWAY CR/TRIB	DANVILLE O	8	11	60				4			1	89	10	18,000		2			2M	-	-
AUGLAIZE RIVER	DEFIANCE O	11	21	60						6	25	25	50	300				4	5M	4	-
HALLEY CREEK	LESTER O	6	5	60					5		0	100	0	75				4	-	-	-
MILLERS FORK	LEWISBURG O	7	13	60		2					-			-				4	1M	10	-
OLD TOWN CREEK	LOGAN OHIO	11	--	60					5		-			-			3		-	2	-
L BEAVER CREEK	LUSK LOCK O	7	6	60				4			-			-				4	5M	-	-
ROCKY RIVER	MEDINA O	7	11	60			3				1	79	20	1,000			3		-	-	-
NORWALK CREEK	NORWALK O	6	24	60					5		30	70	0	-				-	4M	5	-
SANDUSKY RIVER	TIFFIN O	9	22	60						6	1	1	98	112				4	-	-	5
GREAT MIAMI RIV	TROY O	8	27	60				4			5	50	45	59,683	1				4M	2	-
MOLES CREEK	W CARROLTON O	6	19	60						6	0	100	0	600				-	1M	-	-
SCIOTO RIVER	WAVERLY O	8	1	60						6	10	60	30	-				4	-	1	-
L SALT CREEK	ZANESVILLE O	8	31	60	1						7	90	3	179,389	1				-	4	-
OKLAHOMA																					
FORT GIBSON LAKE	WAGONER OKLA	7	25	60				4			-			-			3		3M	-	-
FORT GIBSON LAKE	WAGONER OKLA	8	20	60				4			-			-			3		3M	-	-
DIRTY CREEK	WEBBER FLS OKLA	8	10	60		2					-			-		2			-	-	-
OREGON																					
PERIWINKLE CREEK	ALBANY ORE	5	1	60				4			25	10	65	6,000	1				10M	20	-
RICKREALL CREEK	DALLAS ORE	7	27	60			3	4			10	0	90	-		2			-	2	-
COLORADO LAKE	CORVALLIS ORE	6	13	60						6	60	0	40	1,000				4	60A	2	-
JOHNSON CREEK	HEPPNER ORE	7	4	60		2					100	0	0	75			3		2M	-	-
UPPER KLAMATH LK	KLAMATH FLS ORE	6	18	60		2					20	0	80	-	1				-	3	-
SPRING CREEK	MILWAUKIE ORE	5	11	60		2					100	0	0	2,000	1				2M	3	-
MCKINNEY CREEK	SALEM ORE	6	11	60		2					10	10	80	5,000	1				10M	3	-
NECANICUM RIVER	SEASIDE ORE	7	30	60						6	-			-		2			1M	-	-
NECANICUM RIVER	SEASIDE ORE	8	27	60					5		100	0	0	-		2			1M	1	-
PENNSYLVANIA																					
WISSAHICKON CK	AMBLER PA	9	27	60				4			-			-				4	-	-	-
BUFFALO RUN	BELLEFONTE PA	10	12	60	1						25	75	0	141				-	1M	-	-
LEHIGH RIVER	BETHLEHEM PA	7	7	60				4			30	70	0	4,480				4	-	-	-
BIG CATAWISSA CR	BRANDONVILLE PA	6	7	60		2					100	0	0	85			3		-	1	-
INLET RUN	CONEAUTVILLE PA	6	20	60		2					100	0	0	276			3		3M	1	-
RAMBO RUN	CROSS ROADS PA	6	4	60		2					8	92	0	4,195	1				1M	2	-
PARKE RUN	DOWNINGTOWN PA	11	27	60				4			0	0	100	142				-	-	1	-
LAKE ERIE	ERIE PA	6	8	60				4			100	0	0	200	1				1A	1	-
LEHIGH RIVER	HOPEVILLE PA	6	24	60				4			50	50	0	8,680		2			-	1	-
LEHIGH RIVER	HOPEVILLE PA	7	27	60				4			50	50	0	680			3		1M	-	1
TRIB-SUSQUEHAN R	HUMMEL WHARF PA	7	29	60				4			0	100	0	2,500			3		1M	-	-
MARTINS CREEK	KEELERSBURG PA	7	19	60		2					95	5	0	197				4	1M	-	1
POHOPOCO CREEK	KRESGEVILLE PA	11	10	60					5		-			-				4	6M	7	-
MILL CREEK	LEVITTOWN PA	8	7	60					5		65	35	0	7,400	1				1M	-	12
TRIB-16 MILE CR	NORTH EAST PA	7	25	60				4			33	67	0	2,000	1				1M	-	-
SAGE RUN	OIL CITY PA	10	12	60					5		20	80	0	2,330		2			1M	-	4
HAMMER CREEK	REXMONT PA	6	16	60					5		20	80	0	249			3		-	1	-
MANATAWNY CREEK	SHANESVILLE PA	6	16	60		2					0	100	0	2,000	1				1A	1	-
BEAR CREEK	SOUTH GIBSON PA	11	26	60					5		0	100	0	100			3		-	-	2
PENNS CREEK	SPRING MILLS PA	10	17	60				4			0	100	0	150				-	2M	-	-
CONNEAUT CREEK	SPRINGBORO PA	8	26	60				4			50	50	0	-			3		1M	2	-
LITTLE BEAVER CR	STRASBURG PA	7	20	60		2					100	0	0	53				4	-	-	1
TRIB-PEQUEA CR	STRASBURG PA	6	--	60						6	25	75	0	84				4	1M	-	1
SATTERLEE H RUN	TOWANDA PA	7	15	60					5		90	10	0	500			3		2M	-	-
ROUGH RUN	W WINFIELD PA	7	22	60		2					40	60	0	1,000				4	1M	-	-
WHITE CLAY CR/W	WEST GROVE PA	8	3	60		2					40	60	0	1,152				4	1M	-	-
PINE CREEK	WEXFORD PA	6	8	60					5		0	100	0	200				4	1M	-	12
FISHING CREEK	WINDSOR PA	12	2	60				4			0	100	0	2,100			3		-	2	-
DELAWARE CANAL	YARDLEY PA	6	2	60		2					97	3	0	10,627	1				4M	1	-

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		MONTH	DAY	YEAR	MUNICIPAL OPERATIONS (1)	AGRICULTURAL POISONS (2)	DOMESTIC SEWAGE (3)	INDUSTRIAL WASTES (4)	OTHER (5)	UNKNOWN (6)	GAME	FORAGE	TRASH		TOTAL (1)	HEAVY (2)	MODERATE (3)	LIGHT (4)		DA.	HR.
TENNESSEE																					
CANEY CREEK	JAMESTOWN TENN	6	12	60				4			-			-			3		1M	-	-
OLD HICKORY LAKE	OLD HICKORY TEN	12	1	60						6	83	0	17	-				4	1A	1	-
CRABORCHARD CR	ROCKWOOD TENN	7	25	60	1						40	20	40	-	1				6M	-	-
TEXAS																					
SKULL CREEK	ALTAIR TEX	6	14	60				4			25	40	35	-	1				4M	9	-
UPR GALVESTON BY	BAYTOWN TEX	10	19	60				4			0	100	0	-				4	10M	3	-
WHITE OAK CREEK	COCKVILLE TEX	7	12	60						6	40	25	35	850		2			1M	-	6
CEDAR CREEK	DIBOLL TEX	6	7	60			3				-			-	1				3A	3	-
TEN MILE CREEK	DUNCANVILLE TEX	6	4	60			3				10	10	80	3,000		2			3M	7	-
DONAHOU CREEK	JARRELL TEX	6	11	60		2					65	15	20	1,200	1				1A	3	-
MEDINA RIVER	MACDONA TEX	6	6	60		2					-			-				4	-	1	-
MEDINA RIVER	MACDONA TEX	6	26	60		2					33	33	33	-			3		14M	2	-
WILSON CREEK	MCKINNEY TEX	7	20	60				4			35	5	60	-		2			3M	2	-
TANKERSLEY CREEK	MT PLEASANT TEX	7	17	60				4			100	0	0	-				4	1M	-	5
STRIKER CREEK	NEW SUMRFLD TEX	8	4	60						6	-			-		2			6M	3	-
LAMPASAS RIVER	OAKALLA TEX	8	24	60						6	40	30	30	-		2			4M	2	-
COLORADO RIVER	ROBERT LEE TEX	6	12	60				4			2	0	98	-			3		7M	1	-
MAIN CONCHO RIV	SAN ANGELO TEX	7	18	60			3				20	40	40	-			3		4M	2	-
SALADO CREEK	SAN ANTONIO TEX	9	21	60			3				80	0	20	-			3		1M	1	-
LEON CREEK	SAN ANTONIO TEX	12	30	60				4			-			-				4	-	-	-
COLORADO RIVER	SILVER TEX	6	3	60		2		4			5	0	95	500			3		6M	-	6
PALO DURA CREEK	SPEARMAN TEX	1	2	60						6	3	0	97	-			3		7M	2	-
PINE CREEK	WILKINSON TEX	6	26	60				4			15	80	5	-				4	6M	2	-
UTAH																					
UTAH LAKE	PROVO UTAH	3	28	60				4			80	0	20	3,000		2			15M	5	-
UTAH LAKE	PROVO UTAH	5	16	60				4			90	0	10	15,000		2			-	3	-
VERMONT																					
METAWEE RIVER	PAWLET VT	8	27	60					5		60	20	20	3,000		2			3M	1	-
WASHINGTON																					
WILSON-REECER CR	ELLENSBURG WASH	6	30	60		2					80	0	20	3,000		2			20M	1	-
DRAINAGE DITCH 1	RENTON WASH	6	20	60						6	40	0	60	3,000	1				1M	2	-
GOLFCOURSE DRAIN	TOPPENISH WASH	6	21	60		2					25	0	75	-		2			3M	-	-
WEST VIRGINIA																					
KANAWHA RIVER	CHARLESTON W VA	6	20	60				4			1	9	90	-	1				10A	2	-
KANAWHA RIVER	CHARLESTON W VA	8	25	60				4			5	20	75	5,000,000	1				19M	2	-
TYGART/MIDL TRIB	ELLAMORE W VA	9	1	60	1						15	15	70	-		2			20M	3	-
OHIO RIVER	N MARTNSVL W VA	9	7	60				4			0	0	100	-			3		-	-	-
LITTLE HUFF CR	WYOMING W VA	8	10	60	1						10	20	70	-	1				-	7	-
WISCONSIN																					
BEAVER DAM RIVER	BEAVER DAM WISC	7	29	60			3		5		-			-	1				3M	-	-
TENNEY PK LAGOON	MADISON WISC	10	18	60		2					25	25	50	-		2			1A	1	-
WYOMING																					
HORSE CREEK	DUBOIS WYO	12	3	60		2					85	0	15	900	1				3M	3	-

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